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Title

Properties and use of extract from leaves of ginkgo

Page 2, lines 21 to 32

Examples of typical ingredients contained in the extract from the leaves of ginkgo include flavonol glycosides (flavonoids), terpenoids (terpene lactones), proanthocyanidines, shikimic acid, carboxylic acids, long chain hydrocarbons and derivatives thereof, alkylphenols, and the like.

Among these, flavonol glycosides (flavonoid), terpenoids (terpene lactones), and alkylphenols are important ingredients regarding the health in the human body. Thus, standard contents of these compounds in the extract are determined, and such contents are employed in guidelines for the quality control of the extract from the leaves of ginkgo. The chemical structures of these compounds are shown in Fig.1.

Figures in page 2

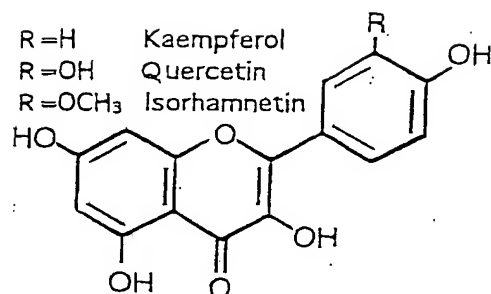


Fig.1-1 an ingredient (a flavonoid) in the leaves of ginkgo.

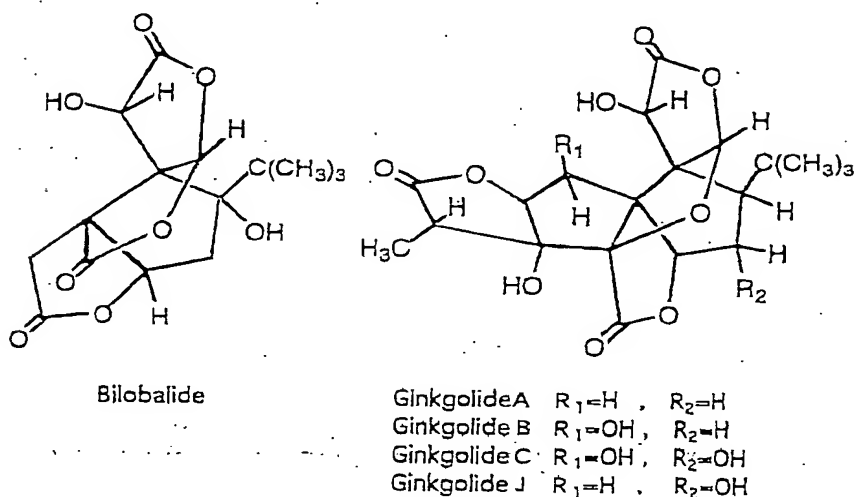
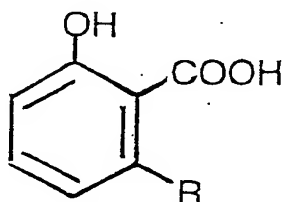


Fig.1-2 an ingredient (a terpene lactone) in the leaves of ginkgo.



Anacardic acid Ia  $R=(CH_2)_{12}CH_3$   
 Anacardic acid Ib  $R=(CH_2)_7CH=CH(CH_2)_5CH_3$   
 Anacardic acid Ic  $R=(CH_2)_9CH=CH(CH_2)_5CH_3$

Fig.1-3 an ingredient (a alkylphenol) in the leaves of ginkgo.

Page 4, line 31 to page 5, line 10

#### 4-2 Effects of extracts from the leaves of ginkgo on blood and circulatory system

When the extract from the leaves of ginkgo is administered to a mouse or a rat, blood flow is facilitated, and it is observed that the portions where blood vessels are present underneath the surface of the skin such as ear, nose, or the tip of a foot turn to red. Krieglstein et al have found that the cerebral blood flow rate is increased in the ratio of 50% to 100% by administering the extract from the leaves of ginkgo to rat. When microspheres (50  $\mu$ m) are injected to cephalic artery in rat to cause thrombosis artificially, the blood flow rate of the embolized hemisphere is decreased. However, it is known that when the extract from the leaves of ginkgo was administered to rat every day before such artificial thrombosis is caused, a decrease in the cerebral blood flow rate is suppressed. It is considered that the effect of improving blood flow caused by administration of the extract from the leaves of ginkgo closely relates to the actions of ingredients in the extract against blood vessels and blood fluidity.

The extract from the leaves of ginkgo promotes the synthesis of prostacyclin that has a vasodilator action in the aorta that has been spayed from rat. Moreover, it is known that blood vessels in cerebral membrane expand by the administration of the extract from the leaves of ginkgo. The blood fluidity associated with blood flow is affected by the viscosity of plasma. It is reported that when the extract from the leaves of ginkgo is administered by intravenous drip to the patients with an episode of cerebral apoplexy whose blood viscosity is higher than that of normal person, blood viscosity decreases significantly, although it does not decrease to the normal level. It is reported that

platelet aggregation is decreased by the administration of the extract from the leaves of ginkgo. In this report, a large amount (i.e., 600 mg) of the extract from the leaves of ginkgo is administered to healthy subject with single dose, blood samples were collected before and after the administration of the extract, and platelet aggregation is examined.

Furthermore, the effects of the extract from the leaves of ginkgo on cardiac function in the case of myocardial ischemia has been examined. In this experiment, model rats are employed. In each of these model rats, left coronary artery has been ligated. As a result, total blood flow rate, heart rate, and arterial pressure after ischemia were not changed, but arrhythmia by ischemia was decreased clearly. Moreover, it is reported that ginkgolide B significantly decreases the occurrence of ventricular arrhythmia caused by a ligation of left coronary artery in a dog.